REGULATING DEVICE

CLAIMS

1. Regulating device (1) for the linear regulation of an actuating element (2) which is connected for movement to a ball spindle drive (3) for the conversion of a rotational movement into a linear movement, whereby the rotational movement can be transferred to the spindle drive (3) from at least one motor (4, 5, 6, 7) via a gear unit (8, 9),
characterised in that
the gear unit (8, 9) exhibits a self-locking, helically toothed spur-wheel gear (10), which is formed as a double helical gear (11, 12) with at least one first (17) and second spiral-toothed gearwheel (18, 19), whereby in each case at least one motor (4, 5, 6, 7) is arranged at both sides of the ball spindle drive (3) and each of the motors is connected for movement with a second spiral-toothed gearwheel (18, 19).

2. Regulating device according to Claim 1,
characterised in that
a ball nut (13) of the ball spindle drive (3) is supported rotationally, but axially immovable in a housing (14) of the regulating device (1) and a rotating spindle (15) of the ball spindle drive (3) is connected for movement to the actuating element (2).

3. Regulating device according to Claim 1 or 2,
characterised in that
the rotating spindle (15) and the bar-shaped actuating element (2) are arranged one behind the other in the axial direction.

4. Regulating device according to Claim 2 or 3,

characterised in that
the ball nut (13) is connected to a first spiral-toothed gearwheel (17) and the motor (4, 5, 6, 7) to the second spiral-toothed gearwheel (18, 19) of the double helical gear (11, 12).

5. Regulating device according to one of the previous claims,
characterised in that
the motor (4, 5, 6, 7) is an electric motor.

6. Regulating device according to one of the previous claims,
characterised in that
both second spiral-toothed gearwheels (18, 19) engage the first spiral-toothed gearwheel (17).

7. Regulating device according to one of the previous claims,
characterised in that
the drive shafts (20, 21) of the motors (4, 5, 6, 7) arranged at both sides run parallel to one another.

8. Regulating device according to one of the previous claims,
characterised in that
at least two motors (4, 5, 6, 7) are arranged on each drive shaft (20, 21).

9. Regulating device according to one of the previous claims,
characterised in that
a reduction gear (22), in particular a so-called harmonic drive (23), is arranged between the drive shaft (20, 21) and the second spiral-toothed gearwheel (18, 19).

10. Regulating device according to Claim 9,
characterised in that

the drive shaft (20, 21) is connected for movement with the flexible, cup-shaped toothed sleeve (24) of the harmonic drive (23).

11. Regulating device according to one of the previous claims,
characterised in that
a diagonal angle (25) of the helical gearing of the first (17) and/or the second spiral-toothed gearwheel (18, 19) is in the range from 50 to 90° and particularly in the range from 65 to 85°.

12. Regulating device according to one of the previous claims,
characterised in that
the transmission ratio of the double helical gear (11, 12) is between $i = 25$ and $i < 1$.

13. Regulating device according to one of the previous claims,
characterised in that
the housing (14) is formed as a module housing (27) which can be flange-mounted on a control mechanism (26), which is particularly deployed in the field of gas and/or oil supply.

14. Regulating device according to Claim 13,
characterised in that
the module housing (27) exhibits a first and second housing half (28, 29), whereby the motor (4, 5, 6, 7) and the ball spindle drive (3) are located in the first housing half (28).

15. Regulating device according to Claim 13 or 14,
characterised in that
an intermediate cover (30) is arranged within the module housing (27) for at least single-ended support of the second spiral-toothed gearwheels (18, 19).

16. Regulating device according to Claim 15,

characterised in that
a position sensor (31) for the acquisition of the position of the rotating spindle (15) and/or the ball nut (13) is arranged on the intermediate cover (30).

17. Regulating device according to one of the previous claims,
characterised in that
the first spiral-toothed gearwheel (17) is mounted, in particular releasably, on an end (32) of the ball nut (13) facing away from the actuating element (2).

18. Regulating device according to one of the previous Claims 2 to 17,
characterised in that
an intermediate ring (34), in particular capable of being screwed externally onto the ball nut, is arranged between the ball nut (13) and the first spiral-toothed gearwheel (17).

19. Regulating device according to one of the previous Claims 2 to 18,
characterised in that
the ball nut (18) is held immovably in the axial direction by pivot bearings (35) and a retention ring (36) which is mounted in the housing (14), releasably where applicable.

20. Regulating device according to one of the previous Claims 2 to 19,
characterised in that
the actuating element (2) and/or the rotating spindle (15) are supported rotationally rigidly in the housing (14), in particular using a splined shaft (37).

21. Regulating device according to one of the previous Claims 5 to 20,
characterised in that
the electric motors (4, 5, 6, 7) are synchronised.

22. Regulating device according to one of the previous claims,
characterised in that

the first (17) and second spiral-toothed gearwheels (18, 19) exhibit 1 to 10, preferably 1 to 7 and especially preferably 1 to 4 teeth (38).

23. Regulating device according to one of the previous claims,
characterised in that
the drive shafts (20, 21) are synchronised in their rotational movements using a mechanical coupling device (53).